be preferred, he does not object. This latter transit cor­responds in syzygy to the average interval. At this period of the moon's age, the lunitidal interval changes rapidly, whereas the height of high water is stationary ; so that it is impossible to determine directly and with accuracy, how long, after a given transit, the highest tide takes place.

From Mr Lubbock’s examination of the progress of the tide-wave, the vulgar establishments of the following places are, at

h. m.

Brest 3 48, reckoned from transit D

Plymouth dockyard 5 33, D

Isle Brehat 5 52 D

Pembroke dockyard 6 4, I)

Bristol, Cumberland Gates, 7 15, D

Howth harbour 11 8 D

Liverpool dock 11 25, D

Portsmouth dockyard 11 40, D

Leith 2 0, E

London docks 1 57, F

From this it is evident that the establishments of ports as given in various works, often very inaccurately, are besides referred to different transits of the moon without distinc­tion, thereby creating great confusion.

Hence also it is found that the tide arrives at Days, h. m.

Brest.... .... 1 4 27

Portsmouth 1 12 2

Liverpool 1 12 2

Leith 115 15 1

London Docks..2 3 16 {after transit B, when the moon is in syzygy.

So that the tide takes twenty-three hours forty-nine mi­nutes in travelling from Brest round the north coast of Scotland to the London docks. We are deficient of in­formation with respect to the course of the tide-wave in the Pacific Ocean ; and even on our own coasts the number of places of which the establishment is accurately known is probably very small. The tide takes about twelve hours in proceeding from the Cape of Good Hope to Cape Blanco ; thence it reaches Brest in about four hours. the crest of the tide-wave thus travels over the open ocean with im­mense rapidity, and gives rise to a slow current, with which, however, it must not be confounded.

At the instance of Mr Whewell, the British Association, with the view of ascertaining what surface ought to be taken as the permanent level of the sea, caused a level line to be carried with great accuracy from the north shore of Somer­setshire to the south shore of Devonshire ; and the position of this line has been fixed, so as to be recognised at any future time, by means of marks at Axmouth, at East Quantockshead, at Stolford, and at Portishead. This line has also been referred to the sea at its extremities ; and the ob­servations show that the mean between the heights of high and low water coincides, at least very nearly, at different places, as well as at the same place at different times. While the difference of the levels of low water at Axmouth on the English Channel, and Wick Rocks on the Bristol Channel, is not less than twelve feet, the mean water at those two places coincides in level within a few inches. Against these conclusions, Mr Thomas has, in the Philoso­phical Magazine for August 1840, alleged various facts, which we have no means of testing or deciding upon. To one part however there seems a more serious objection than any that he has stated ; for though we should think the mean water very likely to be nearly constant everywhere, it cannot be all on the same level if there be perpetual high water at some places, as Mr Whewell himself alleges.

From six years’ observations made at Plymouth, it ap­pears that the height of mean water is constant from year to year within two or three inches. It appears also that the mean water for each fortnight has a semimenstrual

inequality amounting to six or seven inches, the height of the mean water being greatest when the moon’s transit is at 6h∙ and least when it is at 12h∙ The immediate cause of this is, that the semimenstrual inequality of low water is greater than that of high water at Plymouth. The result of one year’s observations made at Dundee is, that the half-tide level is constant within 1∙5 inch, except at eleven and twelve o’clock, when it deviates two inches on a tide of fourteen feet. At any rate, Mr Whewell's scheme of tak­ing the half-tide level as a standard must be an immense improvement on the old system, in which the heights of buildings and mountains are referred to the level of the sea, or to high or low water mark. The heights of spring or neap tides, although not subject to so much uncertainty, are also quantities too vague to be used with propriety as stand­ards of reference.

It had been long observed by the people about Stock­holm, that when the water in the harbour, which is an in­let of the Baltic Sea, subsides so as to allow the waters of the Malar Lake, which has almost the mean level of the sea, to have free exit, the air is clear and dry ; but when the reverse occurs, or the sea flows into the Miilar, wind and rain are likely soon to follow. This phenomenon was investigated by N. G. Schulten, who, after he had ascer­tained the truth of the popular belief, and compared it with the corresponding state of the barometer, explained it at considerable length in the Transactions of the Royal Aca­demy of Stockholm for 1806, by referring it to opposite changes taking place simultaneously in the atmospheric pressure at Stockholm and in that at some considerable distance. The increment of pressure at the one place tend­ing to depress the water there, just when the decrement of pressure at the other allows the water to rise, and the to­tal pressure over the whole ocean being supposed constant, a tendency to equilibrium will result. Schulten’s explana­tion, of which we suppose this to be the substance, is em­barrassed with some irrelevant considerations ; but there can be no doubt that it at the same time involves the true prin­ciple. His ideas, although well known at Stockholm, have not in other countries met with the attention they deserve. Some years ago they received a confirmation from Μ. Daus- sy, who, without being aware of Schulten's researches, has, from his own observations made at Brest, deduced the ef­fects due to the changes of atmospheric pressure. Some account of these, accompanied by barometric tables, has been published *(Connaissance des Terns* for 1834, and *An­nales de Chimie,* tome lxii.), and clearly exhibits the con­nection between the phenomena in question.

Mr Lubbock verified the same fact both at Liverpool and at London. At Liverpool he found the water rise eleven times as much as the barometer falls ; and therefore the range of the barometer being three inches, the correction due to change in the atmospheric pressure may there amount to thirty-three inches. At London the water rises seven times as much as the mercury falls, and hence the range of the correction there is about twenty-one inches. On the coasts of Cornwall and Devon, Mr Walker found, that in ordinary cases a change of one inch in the barometer cor­responds to sixteen on the height of the sea ; but that in very sudden changes of pressure, one inch of mercury cor- responds to twenty of sea-water. This last has been ac­counted for by considering that a sudden impulse given to the water would cause a rise or fall in the manner of a wave, beyond that strictly due to mere change of pressure. But this would at best hold good near the time of such change ; and Mr Lubbock has remarked that it is sometimes very difficult to distinguish between the effects of pressure and those of the wind. Both wind and pressure may require to be attended to, especially where tide observations are continued during only a limited period. From the facts above stated, it would rather seem that the more confined the situation,